IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

TALBOT ALBERT CHUBB

Serial No. 10/696,645

ART UNIT
3641

Filed: 10/30/03

Examiner
Rick Palabrica

For: Process for Generating
Nuclear Heat

## RECONSIDERATION OF CLAIMS

Reconsideration of the Claims 1-4 under 35 USC 112 is respectfully requested. The addition to the Specification is believed to include subject matter which sets forth the invention as claimed.

Reasons are:

1. Whereas the specification refers to the invention being directed to radiationless cold fusion wherein deuterium participates in exothermic reactions, the reactions do not occur "in electrolytic cells with solid electrolyte". Instead, the reactions occur within a contacting a catalytic metal plate reactor containing embedded diffusion-inhibiting layers of CaO which provide inside-metal salt-metal interface layers. The implementing apparatus is not a variant of the Fleischmann and Pons (F and P) electrolytic cell, which contains no such layers. It is a variant of the Iwamura et al. transmutation device, but differs in having no "transmutation binding device that bind the material that undergoes nuclide transmutation onto one surface" of a plate" reactor "structure body". The cold fusion process uses permeation flow through the reactor plate. Electrolysis is used to support steady state at a higher deuterium permeation rates at higher D/Pd ratio than taught by Iwamura et al..

2. Reputable evidence supporting claims for exothermic nuclear reaction has been provided by Iwamura et al. in the referenced papers, and also in talks given by Iwamura at ICCF10 and the ICCF11 meetings. My notes taken during Iwamura's ICCF11 talk show for the Cs to Pr exothermic transmutations: "60 times, every time success, but amount of Pr differs, CaO required, $H_2$ doesn't give transmutation". A copy of notes taken during Iwamura's talk is enclosed. The developmental history leading up to the Iwamura et al. permeation reactor studies, plus the details of control testing demonstrated in their papers, makes their work credible to those who are skilled in the catalysis art and who have read their papers.

3. For the reasons cited in argument 1 the invention is not a variation of the cold fusion concept or system set forth by F and P. Since the process is not a variant of the process of F and P, the reference to Horanyi does not apply.

4. The Dash patent application has been judged to be a variation of the F and P concept or system. Based on argument 3, the rejection by the Dash Examiner does not apply.

5. The arguments for exothermic transmutation occurring in the Iwamura et al. permeation tests are based on detection of non-radioactive nuclear products that can only be produced by exothermic nuclear reaction or contamination. The heat generated is calculated from known heats of formation based on nuclide mass change. The non-electrolytic process employed, the controls against feedstock contamination, and the tests on metal purity exclude the contamination possibility. The possibility that Praseodymium oxide could have been could be present in the CaO layers and have an effect on surface composition is excluded by the impossibility of chemical reduction of the oxide by the permeation process and/or hydrogen employed. Therefore, uncertainty in calorimetry measurements that test for F and P does not apply. Since the following Examiner's references do not test for Iwamura et al. excess heat, namely references to Kreysa et al., Lewis et al., Browne, Ohashi and Morozumi, and Miskelly et al., do not apply.

6. Those skilled in the nuclear physics and nuclear fusion art state that there is no reputable evidence for neutron, gamma ray, or tritium production in support the allegation that nuclear reactions are taking place. Although arguments against this statement could be made, such arguments are unnecessary, since the catalytic fusion process based on configuration change to Bloch geometry forbid production of energetic particles or gamma rays in the dissipation of nuclear reaction energy. Instead, channels for energy transfer from exothermic nuclear product to hosting metal are provided by lattice degrees of freedom inherent in the Bloch geometry. Those skilled in the nuclear physics and nuclear fusion arts are skilled in energetic particle scattering theory, or in high energy nuclear matter states, such as characterize muon-catalyzed fusion. Neither of these specialties apply to the applicable catalytic configuration change science.

7. Those skilled in the nuclear physics and nuclear fusion art state that there is no reputable evidence for helium production in support the allegation that nuclear reactions are taking place. This statement is in error regarding production of $^4$He. Substantial mass spectroscopy evidence for production of 4He has been supplied by Miles and coworkers, by Arata and Zhang, by DeNinno and coworkers, and McKubre and coworkers. Measurement of $^4$He at the levels expected for nuclear fusion at 24 MeV per $^4$He nucleus produced is a specialty art that is distinct from the nuclear physics and nuclear fusion arts. These experimenters use special equipments and control technologies that the validity of the concentration measured. In some cases the amounts exceeds the concentrations present in the atmospheric environment, and the amounts are quantitatively compatible with expectations based on measured integrated excess heat.

8. In referencing Iwamura et al. the author has presented reputable and factual evidence that supports the validity of the claimed process in its ability to produce reproducible, sustainable excess heat.

9. Regarding Shanahan's questioning of Iwamura's claims because of "Reagent purities were not high enough to preclude surface contamination, minimal attempts to eliminate contamination as a source were inadequate, and statement that could detect 0.01 ppm Pr, if present, is an assertion", the following is relevant: The surface composition is measured by in high vacuum by XPS prior to turn-on of deuterium permeation flow, I know of no volatile Pr compounds that could be embedded in the deuterium gas., The before start measurement of the surface composition precludes significant Pr surface contamination being present, despite Shanahan's arguments. Also, there is no need to detect 0.01 ppm Pr on the surface or in the near surface volume, because the final observed concentration of Pr exceeds 25% of a mono-layer. A selective migration against such a high concentration gradient is unphysical.

10. The Sugaya et al. apparatus does not include a catalytic metal plate reactor containing embedded diffusion-inhibiting layers of CaO which provide inside-metal salt-metal interface layers, and therefore does not apply. The additional critical features are described in Iwamura et al. which describe deuterium permeation through a metal reactor plate containing embedded CaO material. The Sugaya et al. diffusion controlling layer does not have embedded CaO material that provides a CaO metal interface layer, so cannot read on the diffusion-impeding layer used in the claimed process.

11. The Examiner references a number of papers concerned with the establishing limits on detection of emitted neutrons, gamma rays, electrons, and protons, e.g. Salamon, et al. Shari et al. Cribier et a;. Price et al. Schrieder et al, Cribier et al. Price et al., Ziegler et al, Hajdas et al.. Faller et al., Hilts, Stipp, Chapline, Alber et al., and David,. The measurements and discussions provided by these references apply only to fusion produced by impacts or extraordinarily high deuteron concentrations. These papers do not apply to catalyzed cold fusion where a geometric form of deuterium is produced that involves multiple centers of charge density, as described in the amended specification. Energetic neutrons, gamma rays, electrons, protons, tritons, 3He nuclei, neutrinos, etc. cannot map onto a geometry that describes multiple centers of charge at lattice spacing. Therefore, they cannot participate in the process nuclear reaction. In contrast, lattice phonons can map onto a nucleus having an array geometry. Therefore, these energetic products are not expected, except possibly as an aberration of primary energy production.

The catalysis geometry change speculated to occur is not an unusual change, in that it occurs with electrons during electrolysis at the anode. For example, the electrons on the OH- ion leave the electrode at the anode and change from localized configuration to Bloch geometry, replacing similar electrons undergoing the reverse type of transition at the cathode. Also, surface H and D atoms have been shown to be similarly converted on metal-vacuum

interfaces by an incident flux of low energy electrons in experiments by Puska et al and Astaldi et al.

12. The amended Specification describes the invention process as "a catalytic process in which surface and interface sciences are used to reduce the temperature at which exothermic reactions can take place. Catalysis substitutes configuration change for kinetic impact in promoting reaction. The configuration change employed is a coherent partitioning of the deuterium ion within an interface layer between a metal lattice and an ionic crystal." The amended Specification states, "In the process a portion of a forced deuterium flow through a metal reactor makes contact with a salt-metal interface volume inside the reactor metal and undergoes a catalyzed configuration change and subsequent radiationless fusion reaction". It states, "The apparatus supporting the process uses solid electrolyte electrolysis cells in contact with an Iwamura-type reactor plate to maintain and control a continuous circulation of deuterium through the reactor plate at a higher flow rate and higher D/Pd ratio than exists during the Iwamura et al. experiments." This description, in combination with argument 1, enables one skilled in catalysis, fuel cell, and condensed matter physics arts to make and use the invention.

13. The process steps described in Claims 1-4 require deuterium flowing through a Pd plate reactor containing at least one diffusion-impeding layer of CaO. This description guarantees the presence of inside-metal CaO-metal interface volumes which function as a catalyst where the deuterium changes to coherently partitioned form, resulting in the generation of heat by exothermic nuclear reaction. Unlike the teachings of Iwamura et al., the claimed process does not require transmutation material on a surface of the Pd plate reactor.

Reconsideration of the rejection of Claim 1 under 35 USC 102 as anticipated by Joshi is respectfully requested because Joshi does not teach the required use of a metal plate reactor containing salt-metal interface volumes such as are present when the reactor contains one or more Iwamura-type diffusion-inhibiting layers.

Reconsideration of the rejection of Claim 1 under 35 USC 102 as anticipated by Sugaya et al. is respectfully requested because the diffusion of deuterium containing molecules in a metal is different from the diffusion of deuterons in non-molecular form, and because Sugaya et al. do not teach the required use of a metal plate reactor containing salt-metal interface volumes such as are present when the reactor contains one or more Iwamura-type diffusion-inhibiting layers

Reconsideration of the rejection of Claim 2 under 35 USC 102 as unpatentable over Joshi in view of McIntyre et al is respectfully requested because McIntyre et al. combined with Joshi do not teach the required use of a metal plate reactor containing salt-metal interface volumes such as are present when the reactor contains one or more Iwamura-type diffusion-inhibiting layers.

Reconsideration of the rejection of Claim 3 under 35 USC 102b as anticipated by Joshi is respectfully requested because Claim 3 is dependent on Claim 1 and Joshi does not teach the use of a metal plate reactor containing salt-metal interface volumes such as are present when the reactor contains one or more Iwamura-type diffusion-inhibiting layers.

Reconsideration of the rejection of Claim 4 under 35 USC 103a as unpatentable over Joshi because Claim 4 is dependent on Claim 1 and because Joshi does not teach the required use of a metal plate reactor containing salt-metal interface volumes such as are present when the reactor contains one or more Iwamura-type diffusion-inhibiting layers.

Idota combined with Joshi does not meet the requirements of Claim 4 because Claim 4 is dependent on Claim 1 and because Idota combined with Joshi does not teach the required use of a metal plate reactor containing salt-metal interface volumes such as are present when the reactor contains one or more Iwamura-type diffusion-inhibiting layers.

Reply References

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